widen the range, you can use a two-stage attenuator. **Figure 2** shows such an amplifier and its recorded characteristic. The applications of the nonlinear attenuator are not limited to increasing dynamic range. You can obtain a square-law response, for example, by putting the attenuator in a feedback circuit (**Figure 3**).

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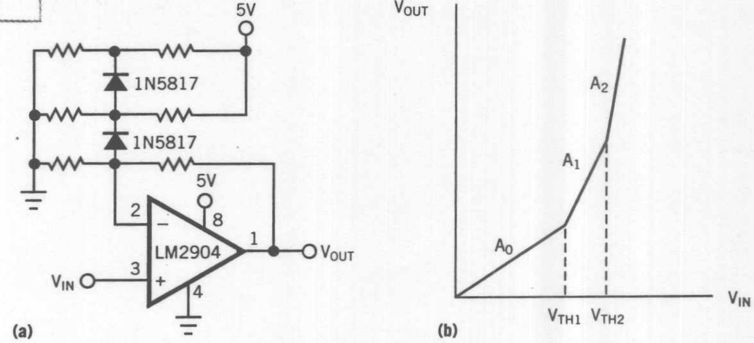
**Figure 3**



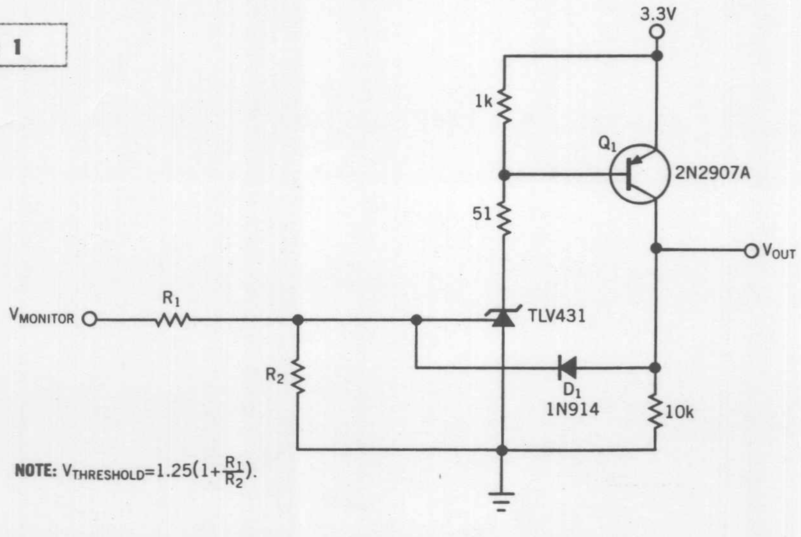

**A nonlinear attenuator in the feedback loop (a) results in a square-law characteristic (b).**

# Regulator IC forms convenient overvoltage detector

*Robert Bell, On Semiconductor, Phoenix, AZ*

Figure 1 shows a simple, standalone overvoltage detector. The intent of the circuit is to monitor a voltage, $V_{MONITOR}$, and set the output, $V_{OUT}$, high when the monitored voltage exceeds a preset threshold. The minimum allowable threshold for this circuit is 1.25V. The operation of the circuit revolves around the TLV431 shunt regulator. This IC is based on the popular TL431 shunt regulator. The difference is that the TLV431's internal reference is 1.25V, as opposed to 2.5V for the TL431. When the voltage at the control input is less than 1.25V, the regulator's cathode current is essentially zero. If the control input exceeds 1.25V, the cathode conducts and turns $Q_1$ on to produce a high output at $V_{OUT}$. The trip threshold, determined by resistors $R_1$ and $R_2$, is $V_{THRESHOLD}=1.25(1+R_1/R_2)$. $D_1$, the diode between $V_{OUT}$ and the control input, provides hysteresis and latches the overvoltage fault condition. If you don't need latching operation, you can add a resistor in series with the diode to lower the hysteresis value and prevent the circuit from latching.

**Figure 1**




**NOTE:** $V_{THRESHOLD}=1.25(1+\frac{R_1}{R_2})$.

**A shunt regulator makes an inexpensive overvoltage detector.**

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